

REMARKS

Upon entry of this amendment, claims 1-3, 7-26 and 28-57, as amended, and new claims 58-59 will be pending. Claims 17 and 42 were amended to correct typographical errors. Claim 1 was amended to recite a water soluble hemicellulose-based composition comprising non-cellulosic, non-starch hemicellulose material; an oxidase; and an oxidase substrate, wherein the hemicellulosic material comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate and claim 17 was amended to recite a process of effecting gelation of such a composition. Claim 19 was amended to delete “and optionally an oxidase substrate and/or a peroxidase” and new claim 58 was added to claim a process for effective oxidative gelation that further comprises supplementing hemicellulose material with an oxidase substrate and/or a peroxidase. Claim 22 was amended to delete “and optionally a peroxidase” and new claim 59 was added to claim a process for producing a hemicellulosic composition that further comprises supplementing the hemicellulose material with a peroxidase. Claims 2, 3, 7-13, 16-17, 19, 20, 22-23, 26, 28, 30-39, 41-42, 53, and 57 were amended to make the terms consistent with new claims 1 and 17. The amendments are fully supported by the specification as originally filed and thus, no new matter has been added.

The claims particularly point and distinctly claim the subject matter

Claims 1-3, 7-26 and 28-57 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject which applicant regards as the invention.

In particular, the Examiner contends that the multiple use of the term “comprising” in claim 1 makes claim 1 and its dependent claims indefinite. The Examiner further asserted

that the misspelling of "hemicellulosic" in claim 1 renders it indefinite.

Claim 1 was amended to correct the typographical error in the term "hemicellulose," overcoming its alleged rejection as being indefinite. Further, claim 1 now recites a water soluble hemicellulose-based composition comprising non-cellulosic, non-starch hemicellulose material; an oxidase; and an oxidase substrate; wherein the hemocellulosic material comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate. Accordingly, there should be no confusion in the phrase "wherein the hemocellulosic material comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate," overcoming the Examiner's rejection of claim 1 and its dependent claims regarding the term "comprising."

The Examiner also rejected claim 10 because the phrases "substantially free of molecular oxygen" is indefinite and unclear as to how much oxygen may be present. The term "substantially" has been found to be definite if it is clear what the term means in view of the general guidelines of the specification (*See, In re Mattison*, 509 F.2d 563, 184 USPQ 484 (CCPA 1975); MPEP §2173.05(b) (August 2001)) or if one of ordinary skill in the art would know what is meant by the phrase containing "substantially" (*See, Andrew Corp. v. Gabriel Electronics*, 847 F.2d 819, 6 USPQ2d 2010 (Fed. Cir. 1988). In *Seattle Box Co. v. Industrial Crating & Packing*, 731 F.2d 818, 826, 221 USPQ 568, 573-574 (Fed. Cir. 1984) (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1557, 220 USPQ 303, 316 (Fed.Cir.1983), *cert. denied*, 469 U.S. 851, 105 S.Ct. 172, 83 L.Ed.2d 107 (1984)), the court remarked that "substantially equal" is a term of degree, and that its acceptability depends on "whether one of ordinary skill in the art would understand what is claimed ... in light of the specification", even if experimentation may be needed.

Applicants respectfully submit that one of ordinary skill in the art would know that

“substantially free of molecular oxygen” in claim 10 includes a permissible amount of molecular oxygen such that the solution does not undergo oxidative gellation when read in light of the specification. Indeed, the Specification at page 12, lines 7-13 describe solutions that are “preferably oxygen free . . . and effectively exclude oxygen” and that such solutions may be formulated to be self-gelling upon exposure to oxygen, such as oxygen in ambient air. Thus, the skilled artisan would know that claim 10 is directed to solutions that have not undergone self-gelling, as well as readily determine the permissible amount of oxygen that may be present such that self-gelling does not occur. Accordingly, the term “substantially free of molecular oxygen” is definite and the Examiner has not demonstrated to the contrary.

The Examiner also rejected the phrase “substantially anhydrous” in claim 35 as being indefinite. Applicants respectfully submit that one of ordinary skill in the art would know that “substantially anhydrous” includes a permissible amount of water such that the powder does not self gel in the presence of air. Indeed, the Specification at page 11, line 26 to page 12, line 6 describe powders that are “formulated so as to be self-gelling on the addition of water in the presence of air.” Such powders, therefore, are formulated so that self-gelling does not occur in the presence of air, and is provided by a formulation that contains no water or a permissible amount of water such that self-gelling does not occur. Accordingly, the term “substantially anhydrous” is definite and the Examiner has not demonstrated to the contrary.

For any of the reasons above, Applicants respectfully request that the rejections of claims 1-3, 7-26 and 28-57 under 35 U.S.C. §112, second paragraph, be reconsidered and withdrawn.

The claims are not anticipated by the prior art

Claims 1-14, 16-23 and 27-29 were rejected under 35 U.S.C. §102(b) as being

U.S. Serial No. 09/308,403

anticipated by U.S. Patent No. 5,108,765 to Maat *et al.* ("the Maat reference") in light of Chemical Abstracts 79(5):30641 (1973) by Geissman *et al.* ("the Geissman reference") for the reasons stated on pages 4-7 of the Office Action. Applicants respectfully traverse.

In order to reject a claim under 35 USC § 102, the Examiner must demonstrate that each and every claim term is contained in a single prior art reference. *See Scripps Clinic & Research Foundation v. Genentech, Inc.*, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81, 90 (Fed. Cir. 1986); *see also* MPEP § 2131 (Rev. 1, February 2000). Claim terms are to be given their plain meaning as understood by the person of ordinary skill in the art, particularly given the limitations of the English language, and claims are to be given their broadest reasonable interpretation consistent with Applicants' specification. Not only must the claim terms, as reasonably interpreted, be present, an allegedly anticipatory reference must enable the person of ordinary skill to practice the invention as claimed. Otherwise, the invention cannot be said to have been already within the public's possession, which is required for anticipation. *See Akzo, N.V. v. U.S.I.T.C.*, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986); *In re Brown*, 141 USPQ 245, 249 (CCPA 1964).

Applicants respectfully submit that the claims are not anticipated by the Maat reference or the Geissman reference. The present invention, as recited in claim 1, is directed to a water soluble hemicellulose-based composition comprising non-cellulosic, non-starch hemicellulose material; an oxidase; and an oxidase substrate, wherein the hemicellulosic material comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate. *See, e.g.*, Specification at page 6, lines 2-4 and 12-14; page 9, lines 4-7; and page 11, lines 21-25. Indeed, the hemicellulose-based composition is completely water soluble.

To the contrary, the Maat reference discloses a flour composition that is, as a whole,

neither water soluble nor non-cellulosic and non-starch. Indeed, one of ordinary skill in the art would recognize that flour comprises starch and cellulose that are insoluble in water. Accordingly, a composition containing flour cannot be considered *completely* water soluble, even though various components of the composition may be water soluble. Since each and every claim term is not contained in either the Maat reference or the Geissman reference, claims 1-4, 6-23 and 27-29 are not anticipated.

Moreover, the Examiner contends that the phrase “consisting essentially of” in claims 55 and 57 does not exclude other ingredients in the prior art composition. However, “consisting essentially of” means that the claim covers the recited materials and other materials that do not materially affect the basic and novel characteristics. MPEP §2111.03 (citing *In re Herz*, 537 F.2d 549, 551-552, 190 USPQ 461, 463 (CCPA 1976)). In the instant application, the claims are directed to non-cellulosic, non starch hemicellulose-based compositions that are completely water soluble and the presence of starch would render the composition *not* completely water soluble, thereby materially affecting the basic and novel characteristics of the composition. Thus, claims 55 and 57 are not anticipated.

Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. §102 be reconsidered and withdrawn.

The claims are not obvious in view of the prior art

Claims 1-14, 16-26, 28-33, 35-47, 49-55 and 57 were rejected under 35 U.S.C. §103(a) as being obvious over the Maat reference in view of the Geissman reference for the reasons stated on page 8-10 of the Office Action. Applicants respectfully traverse.

At the outset, Applicants note the Examiner must show all of the recited claim elements in the combination of references that make up the rejection. When combining

references to make out a *prima facie* case of obviousness, the Examiner is obliged to show by citation to specific evidence in the cited references that (i) there was a suggestion/motivation to make the combination and (ii) there was a reasonable expectation that the combination would succeed. Both the suggestion/motivation and reasonable expectation must be found within the prior art, and not be gleaned from applicants' disclosure. *In re Vaeck*, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991); *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988); *W.L. Gore v. Garlock, Inc.*, 220 USPQ 303, 312-13 (Fed. Cir. 1983) (holding that is improper in combining references to hold against the inventor what is taught in the inventor's application); *see also* MPEP §§ 2142-43 (August 2001). Thus, the Examiner must provide evidentiary support based upon the contents of the prior art to support all facets of the rejection, rather than just setting forth conclusory statements, subjective beliefs or unknown authority. *See In re Lee*, 277 F.3d 1338, 1343-44 (Fed. Cir. 2002).

When an Examiner alleges a *prima facie* case of obviousness, such an allegation can be overcome by showing that (i) there are elements not contained in the references or within the general skill in the art, (ii) the combination is improper (for example, there is a teaching away or no reasonable expectation of success) and/or (iii) objective indicia of patentability exist (for example, unexpected results). *See U.S. v. Adams*, 383 U.S. 39, 51-52 (1966); *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d 1923, 1927 (Fed. Cir. 1990); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve*, 230 USPQ 416, 419-20 (Fed. Cir. 1986).

As discussed above, the Maat reference does not disclose or suggest a composition comprising a non-cellulosic, non-starch hemicellulose material that is not completely water soluble. To the contrary, the present invention, as recited in claim 1, is directed to a water soluble hemicellulose-based composition comprising non-cellulosic, non-starch hemicellulose material; an oxidase; and an oxidase substrate, wherein the hemicellulosic

material comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate.

In support of this traversal, Applicants rely upon the attestations of Dr. Roderick Greenshields in the attached Rule 132 Declaration. Dr. Greenshields explains in paragraph 16 that glucose oxidase, which is used in the Maat reference to improve bread dough quality in a similar way achieved by ascorbic acid, cysteine, lipoxygenase or bromate, is well known to act through the reaction with wheat protein in dough rather than the polysaccharide fraction. In paragraph 17, he elaborates on this point by specifically pointing out that the Maat reference's technique restores the integrity of the dough by strengthening the protein components while desirably degrading the polysaccharide components to give improved crumb softness. Dr. Greenshields further adds that polysaccharide gelling would not be likely because the high starch and protein levels make the composition, as a whole, insoluble in water. In paragraph 18, Dr. Greenshields further adds that the compositions in the Maat reference include xylanase, which degrades any arabinoxylan gels by catalyzing hydrolysis and depolymerization of the polysaccharide chain.

As the Examiner admits, the Geissman reference is not cited as to modify the Maat reference, but to demonstrate that combination of the claimed ingredients would be expected to induce the cross linking reaction responsible for gelling. However, one of ordinary skill in the art would not expect cross linking in the Maat reference's composition in view of the Maat reference and the Geissman reference. Indeed, the Maat reference and Geissman teach away from each other as the Geissman reference discloses gellation of isolated water soluble pentosans, whereas the Maat reference discloses a process that degrades polysaccharides. Accordingly, the skilled artisan would not have any reasonable expectation of success, and therefore there is no proper prima facie case of obviousness.

Claims 1-3, 7-26 and 28-57 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,530,112 to Greenshields *et al.* ("the Greenshields reference") in view of U.S. Patent No. 5,200,338 to Crawford *et al.* ("the Crawford reference") for the reasons stated on pages 7-9 of the Office Action. Applicants respectfully traverse this rejection.

A greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness of the claims at issue. *In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985). Presence of a property not possessed by the prior art is evidence of nonobviousness. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). Applicants respectfully submit that in the instant application, the polymerization and gelling of the compositions that occurs using *in situ* generation of hydrogen peroxide is unexpected in view of the Greenshields and the Crawford reference and rebuts the Examiner's contention of obviousness. In support of this traversal, Applicants rely upon the attestations of Dr. Roderick Greenshields in the Rule 132 Declaration. Indeed, Dr. Greenshields Declaration demonstrates such unexpected results and that one of ordinary skill in the art would not be motivated to combine the teachings of the Greenshields reference and the Crawford reference.

The Greenshields reference, in which Dr. Greenshields is an inventor, discloses oxidative cross-linking of ferulic acid, which is associated with polysaccharides extracted from cell walls of plants, resulting in a rigid, insoluble material derived from the polymerization of the polysaccharide. The oxidation is carried out at ambient temperature using hydrogen peroxide in the presence of a peroxidase enzyme.

In contrast, the Crawford reference discloses that by adding glucose and glucose oxidase, sufficient hydrogen peroxide would be generated *in situ* to degrade lignocellulose via the action of lignan peroxidase. However, depolymerization occurs in the Crawford reference by cleaving the ether bonds between the ferulic acid residues. Further, polymerization

reactions as a result of *in situ*-generated peroxide are not disclosed or suggested in the Crawford reference. The Crawford reference, which is directed to depolymerization by cleaving ferulic acid linkages, teaches away from the Greenshields reference, which is directed to polymerization by cross linking ferulic acid. Accordingly, the skilled artisan would not be motivated to combine the Greenshields reference and the Crawford reference to achieve polymerization by generating peroxide *in situ*.

Further, the polymerization and gelling in the instant application in view of the Greenshields reference and the Crawford reference would be unexpected to one of ordinary skill in the art. Indeed, *in situ* generation of hydrogen peroxide would depolymerize hemicellulose material, as had occurred with structurally similar lignin molecules disclosed in the Crawford reference. In the Declaration, Dr. Greenshields explains that when compared to the Crawford reference, the polymerization and gelling in the present invention involve 20 times more glucose and 5000 times more glucose oxidase. Accordingly, one of ordinary skill in the art would be not expect that high levels of glucose and glucose oxidase would polymerize hemicellulose material.

For any of the above reasons, Applicants respectfully submit that the claims are not obvious and request reconsideration and withdrawal of the rejections under 35 U.S.C. §103.

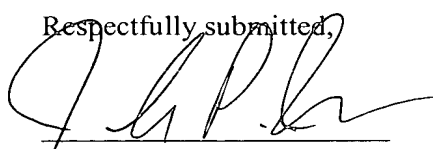
U.S. Serial No. 09/308,403

Request

Applicants submit that the claims are in condition for allowance, and respectfully request favorable consideration to that effect. The Examiner is invited to contact the undersigned at (202) 912-2000 should there be any questions.

9-13-02
Date

Respectfully submitted,


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MARKED-UP COPY OF AMENDED CLAIMS

1. (Twice Amended) A water soluble hemicellulose-based [material comprising a non-cellulosic, non-starch plant polysaccharide,] composition comprising: non-cellulosic, non-starch hemicellulosic material;
an oxidase; and
an oxidase substrate[,];
wherein the [polysaccharide comprises arabinoxylan ferulate and the hemocellulosic] hemicellulosic material [is water soluble] comprises at least one polysaccharide and at least one polysaccharide is arabinoxylan ferulate.
2. (Twice Amended) The [material] composition of claim 1 further comprising a peroxidase.
3. (Twice Amended) The [material] composition of claim 1, wherein the hemicellulose material is derived from cereal, husk or bran, straw, or from legumes.
7. (Twice Amended) The [material] composition of claim 1, wherein said [material] composition is in the form of a powder.
8. (Twice Amended) The [material] composition of claim 7, which further comprises peroxidase, the material being self-gelling on the addition of water.
9. (Twice Amended) The [material] composition of claim 1, wherein the [material] composition is in the form of an aqueous solution.
10. (Twice Amended) The [material] composition of claim 9, which is substantially free of molecular oxygen.
11. (Twice Amended) The [material] composition of claim 10, which further comprises peroxidase and which is self-gelling on exposure to molecular oxygen.
12. (Twice Amended) A gel or viscous medium comprising the [material]

composition of claim 1, which has been oxidatively gelled.

13. (Twice Amended) The gel of claim 12, wherein the **[material] composition** comprises cross linked arabinoxylan ferulate.

16. (Twice Amended) A process for preparing a gel or viscous medium comprising the step of oxidatively gelling the **[material] composition** of claim 1 [,].

17. (Twice Amended) A process for effecting oxidative **[gelatin] gelation** of **[a] the** water soluble **hemicellulose-based composition** **[hemicellulosic material, said material comprising non-cellulosic, non-starch plant polysaccharides comprising arabinoxylan ferulate] of claim 1**, comprising promoting the generation of hydrogen peroxide *in situ* by redox enzymes, said generation comprising the steps of:

- (a) providing oxygen to the **[material] composition** and/or
- (b) providing water to the **[material] composition**; and/or
- (c) providing oxidase substrate to the **[material] composition**; and/or
- (d) activating one or more of the redox enzymes.

19. (Twice Amended) The process of claim 17, wherein the process comprises the **[steps] step** of supplementing the **[hemicellulosic material] hemicellulose-based composition** with an oxidase **[and optionally an oxidase substrate and/or a peroxidase]**.

20. (Twice Amended) The process of claim 18, wherein the generation of hydrogen peroxide is promoted by:

- (a) providing oxygen to the **[material] composition** and/or
- (b) providing water to the **[material] composition**; and/or
- (c) providing oxidase substrate to the **[material] composition**; and/or
- (d) activating one or more of the redox enzymes.

22. (Twice Amended) A process for producing the hemicellulosic **[material] composition** of claim 1 comprising the step of supplementing a hemicellulose with an oxidase **[and optionally a peroxidase]**.

23. (Twice Amended) A **[material] composition** produced by the process of claim 22.

26. (Twice Amended) A wound dressing comprising the **[material] composition** of claim 11.

28. (Twice Amended) A foodstuff, dietary fiber source, food ingredient, additive, lubricant, supplement or dressing comprising the **[material, gel or viscous medium] composition** of claim 1, being selected from the group consisting of a petfood, a flavour delivery agent, a canning gel, fat replacer, a coating, a glaze, a bait and a gelatin replacer.

30. (Amended) The **[material] composition** of claim 1, wherein the oxidase is glucose oxidase.

31. (Amended) The **[material] composition** of claim 2, wherein the peroxidase is horse radish peroxidase.

32. (Amended) The **[material] composition** of claim 2, wherein the oxidase substrate is glucose.

33. (Amended) The **[material] composition** of claim 3, wherein the hemicellulose material is selected from the group consisting of maize, wheat, barley, rice, oats and malt.

34. (Amended) The **[material] composition** of claim 1, wherein the **hemicellulose** material is derived from testaceous plant material containing at least about 20% of at least one of arabinoxylan or glucoronoarabinoxylan.

35. (Amended) The **[material] composition** of claim 7, wherein the powder is substantially anhydrous and further comprises a dispersant.

36. (Amended) The [material] composition of claim 35, wherein the dispersant is selected from the group consisting of glucose and maltodextrin.

37. (Amended) The [material] composition of claim 7, wherein the oxidase substrate is glucose.

38. (Amended) The [material] composition of claim 11, wherein the oxidase substrate is glucose.

39. (Amended) The process of claim 16, wherein the oxidative gelling comprises adding water to the [material] composition or exposing the [material] composition to molecular oxygen.

41. (Amended) The [material] composition of claim 18, wherein the oxidase is a glucose oxidase.

42. (Amended) The [material] composition of claim 18, [where in] wherein the peroxidase is horse radish peroxidase.

53. A foodstuff, dietary fiber source, food ingredient, additive, lubricant, supplement or dressing comprising the [material, gel or viscous medium] composition of claim 23, being selected from the group consisting of a petfood, a flavour delivery agent, a canning gel, fat replacer, a coating, a glaze, a bait and a gelatin replacer.

57. (Amended) The gel of claim 13, wherein the [material] composition consists essentially of cross linked arabinoxylan ferulate.